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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
LAO, LUN S	

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2643	15

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/382,851	Applicant(s) EMERLING ET AL.	
	Examiner Lun-See Lao	Art Unit 2643	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 February 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☒ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Introduction

1. This communication is responsive to the applicant's amendment filed on 02/25/03.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1,9-11,13,15-16, and 35-38, 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Warnaka (US PAT 6,356,641) in view of Clark (US PAT 5,754,664).

Regarding claim 1, Warnaka teaches that an audio system for use in a vehicle having a roof, the system comprising:

an acoustically-insulating headliner adapted to be mounted adjacent the roof so as to underlie the roof and shield the roof from view (see fig.1 and 9), the headliner having an upper surface (see fig.9) and a sound-radiating, lower surface (see col.8 line 32-col.9 line 10);

an array of electromagnetic transducer (see fig.1, (15)) assemblies supported at the upper surface of the headliner (see fig.1);

a source of audio signal (see fig.16, (161) and col.10 line 11-50); and

the headliner is made of a material which is sufficiently stiff (metal, polymer) and low in density (foam and fabri and see col.col.3 line 55 –col.4 line 15) so that substantially the entire headliner acts as a single headliner speaker diaphragm (literally function as a diaphragm in a speaker and see col. 3 line 20-43) , but Warnaka does not teach clearly the signal processing circuitry coupled to the assemblies for processing the audio signals to obtain processed audio signals wherein the assemblies convert the processed audio signals into mechanical motion of corresponding zones of the headliner and radiates acoustic power into the interior of the vehicle with a frequency range defined by a lower limit of 100 hertz or less and an upper limit of 12 kilohertz or more and the processed audio signals at a low end of the frequency range are matched to the processed audio signals at mid and high ends of the frequency range.

On the other hand, Clark teaches the signal processing circuitry (see fig.9) coupled to the assemblies for processing the audio signals to obtain processed audio signals wherein the assemblies convert the processed audio signals into mechanical motion of corresponding zones (see col.5 line 15-col.6 line 50) of the headliner and radiates acoustic power into the interior of the vehicle with a frequency range defined by a lower limit of 100 hertz or less and an upper limit of 12 kilohertz or more and the processed audio signals at a low end of the frequency range are matched to the

processed audio signals at mid and high ends of the frequency range (see col.4 line 5-67).

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Warnaka and Clark to improve audio output controlling system to provide listening pleasure for passengers in the vehicle.

Regarding claims 9-11,13, Clark teaches that the array of electromagnetic transducer assemblies includes a front row of electromagnetic transducer (see fig.1, (18,19,20)) assemblies positioned 5 to 30 inches in front of an expected position of a passenger in the interior of the vehicle and a back row of electromagnetic transducer (see fig.1, (24,29,25,28)) assemblies positioned behind the expected position of the passenger wherein the signal processing circuitry delays (see fig.9) the audio signals coupled to the back row of electromagnetic transducer assemblies relative to the audio signals coupled to the front row of electromagnetic transducer assemblies (see col.8 line44-col.9 line10); and the array of electromagnetic transducer assemblies are completely supported on the upper surface of the headliner (see col.5 line 1-col.6 line 50); and the system is comprising at least one loudspeaker coupled (see fig.1,26,27) to the signal processing circuitry, and adapted to be placed in the interior of the vehicle in front of an expected position (near front corners) of a passenger and below the headliner; and the system of the electromagnetic transducer assemblies are spaced to the left (see fig.3,(26))and right(27) , front (18,19,20)and rear (28,29) of expected positions of passengers in the interior of the vehicle to create proper audio imaging for the passengers (see col.4 lines 7-67).

Regarding claims 15-16, Clark teaches that the system comprises a low frequency speaker (see fig.4, 28) positioned below the headliner in the interior of the vehicle; and the array has front (see fig.9, (18,19,20)) and rear (24,25,28,29) assemblies and wherein each rear electromagnetic transducer assembly is coupled to processed audio signals delayed in time relative to the processed audio signals coupled to each front electromagnetic transducer assembly (see fig.9).

Regarding claims 35-38, Clark teaches that the system of the processed audio signals to be delivered to each electromagnetic transducer assembly may be routed to alternate electromagnetic transducer assemblies to achieve different imaging and performance goals, the processed audio signals being monaural, stereo, or multi channel signals (see fig.9); and an acoustical center channel signal in a multi-channel setup is achieved by sending a processed center channel signal to both left and the right channel electromagnetic transducer assemblies in a row of electromagnetic transducer assemblies and utilizing mechanical mixing of the headliner to move the headliner between the left and right channel electromagnetic transducer assemblies as a center channel speaker (see col.6 line 50-col.7 line 9); and the system is comprising a compliant material positioned between the assemblies and the roof (see col.5 line 15-col.6 line 50); and least one microphone positioned in the interior of the vehicle for intra-cabin and extra cabin communications (cellular, digital, etc) (see col.3 line 49-col.4 line 7).

Regarding claims 40-41, Clark teaches that the system of the signal processing

circuitry utilizes adaptive filtering techniques to perform automatic system equalization (see col.7 line 1-col.8 line 42); and each area in the interior of the vehicle can be separately equalized (see fig.9).

4. Claims 2-4,14,17, are rejected under 35 U.S.C. 103(a) as being unpatentable over Warnaka (US PAT 6,356,641) in view of Clark (US PAT 5,754,664) as applied to claim 1, and further in view of House (US PAT. 5,887,071 hereinafter House).

Regarding claim 2, Warnaka as modified by Clark differs from claim 2 in not disclosing that the system of the vehicle has a windshield and wherein the array of electromagnetic transducer assemblies includes at least one row of electromagnetic transducer assemblies adjacent the windshield and wherein the at least one row of electromagnetic transducer assemblies are positioned 5 to 30 inches in front of an expected position of a passenger in the interior of the vehicle.

However, House teaches that a system of the vehicle has a windshield and wherein the array of electromagnetic transducer assemblies includes at least one row of electromagnetic transducer assemblies adjacent the windshield (see fig.2 (44,46)) and wherein the at least one row of electromagnetic transducer assemblies are approximately positioned 5 to 30 inches (see fig.2, (24,26)) in front of an expected position of a passenger in the interior of the vehicle (see fig.3).

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Warnaka as modified by Clark with the

teaching of House to improve 3D sound system to provide listening pleasure for passengers in the vehicle.

Regarding claims 3-4, House discloses that the system includes at least one row of electromagnetic transducer assemblies are positioned approximately 12 to 24 inches in front of the expected position of the passenger (see fig.1); and least one row of electromagnetic transducer assemblies includes at least two electromagnetic transducer assemblies spaced apart to correspond to left and right ears of the passenger in the expected position of the passenger (fig.2, (24,26)).

Regarding claims 14,17, House discloses that the system comprises at least one loudspeaker positioned in front of expected positions (see fig.2, (24,26)) of passengers below the headliner but not in doors, kick panels, or under a dash of the vehicle; and the audio signals are processed with head-related transfer functions by the signal processing circuitry (see col2 line 27-col.3 line 26).

5. Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Warnaka (US PAT 6,356,641) in view of Clark (US PAT 5,754,664) as applied to claim 1, and further in view of Marquiss (US PAT. 4,385,210 hereinafter Marquiss).

Regarding claim 5, Warnaka as modified by Clark differs from claim 5 in not disclosing that the system of the electromagnetic transducer assemblies includes a magnet for establishing a magnetic field in a gap formed within the assembly, a coil which moves relative to the magnet in response to the processed audio signals, a base fixedly secured to the headliner on the upper surface and electrically connected to the

signal processing circuitry and a guide member electrically connected to the coil and removably secured to the base for supporting the coil in the gap and wherein the coils are electrically coupled to the signal processing circuit when the guide members are secured to their corresponding bases.

However, Marquiss teaches that a system of the electromagnetic transducer assemblies includes a magnet for establishing a magnetic field in a gap formed within the assembly, a coil which moves relative to the magnet (see fig.6) in response to the processed audio signals (see col.7 line 13-40), a base fixedly secured to the headliner on the upper surface and electrically connected to the signal processing circuitry (see fig.7) and a guide member (see fig.6, 50) electrically connected to the coil and removably secured to the base for supporting the coil (see fig.5,29) in the gap and wherein the coils are electrically coupled to the signal processing circuit (see fig.7) when the guide members are secured to their corresponding bases.

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Warnaka as modified with the teaching of Marquiss to provide a thin planar loudspeaker system, which is mounted directly upon and cooperates acoustically with other supportive planar surface.

Regarding claims 6-8, Marquiss teaches that the system of the magnets is a high-energy permanent magnet (see col.6 line 41-col.7 line 25); and the system of the high energy permanent magnets is a rare-earth magnet (see col.6 line41-col.7 line 25); and the system of the assemblies includes a spring element (see col.5 line 61-col.6 line 6) having a resonant frequency below the lower limit of the frequency range when

incorporated within its assembly and connected to its corresponding guide member for resiliently supporting its corresponding magnet above the upper surface of the headliner (see col.5 line 40-col.6 line 6).

6. Claims 18-23 and 25-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Warnaka (US PAT 6,356,641) in view of Clark (US PAT 5,754,664) as applied to claim 1, and further in view of Azima (WO 99/11490 hereinafter Azima).

Regarding claim 18, Warnaka and Clark do not teach clearly that system of the electromagnetic transducer assemblies are supported only on the headliner .

However, Azima teaches that the system of the electromagnetic transducer assemblies are supported only on the headliner (see fig.1).

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Warnaka as modified with the teaching of Azima to provide a good radiation pattern for the confined spaces within a vehicle passenger cabin.

Regarding claims 19-23 Azima teaches that the system of the headliner is self supporting (see fig.1); and the system comprises a semi-compliant attachment mechanism adapted to attach the headliner to the roof along at least a substantial periphery of the roof (see page7 line 1-page8 line 10); and a semi-compliant attachment mechanism adapted to attach the headliner to the roof along at least a substantial

periphery of the roof and a central portion of the roof (see page 13 line 5- page 14 line 12); and a support structure for reinforcing the headliner (see page 14 line 13-page 15 line 20); and the system is comprising framing independent of the headliner to support the assemblies (see page 5 line 10-page 6 line 25).

Regarding claim 25-29, Azima teaches that the stiffness and density of the headliner material is altered around the entire periphery of the headliner to allow for additional excursion of the entire headliner in order to create better low frequency reproduction (< 200 Hz) of the processed audio signals (see page 4 line 13-page5 line 26); and the system is comprising a fabric or other material adhered to the lower surface of the headliner to create a cosmetically acceptable appearance for the system (see page 9 line 15-page 11 line 27); and a fabric or other material adhered to the upper surface of the headliner for routing wires over the headliner in order to keep the wires from vibrating when in contact with a vibrating headliner (see page4 line 12-page 6 line 10); and is comprising audio signal wires integrated into the headliner (see fig.3); and a material adhered to the headliner to provide additional mass or damping or stiffness thereby minimizing unwanted excess vibration caused by any resonances in the headliner material (see page 5 line 15-page 6 line 50).

Regarding claims 30-34, Azims teaches that the system comprises fiberglass or other suitable material positioned between the headliner and the roof to minimize undesirable acoustical reflections from the roof, to minimize standing waves set up in a cavity created between the headliner and the roof and to prevent the array of

electromagnetic transducer assemblies from engaging the roof (see page 14 line 9 – page 16 line 5); and a electromagnetic transducer assembly for a local sound zone is located approximately between 5" and 30" in front of an expected ear location for a passenger (see fig.1); and least one of the electromagnetic transducer assemblies is adhered directly to the headliner (see fig.3); and each of electromagnetic transducer assemblies includes a subassembly having vibrational characteristics and adapted to be screwed, snapped, or twisted into position at the upper surface of the headliner, and wherein vibrational characteristics of each of the subassemblies can be tested for performance and quality prior to its installation on the headliner (see page 9 line 10- page 11 line 20); and each of the assemblies includes a base fixedly secured to the headliner and removably secured to its corresponding subassembly by a mechanical attachment and wherein the mechanical attachment also makes electrical contact between the base and its subassembly (see page 9 line 10- page 11 line 20).

7. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Warnaka (US PAT 6,356,641) in view of Clark (US PAT 5,754,664) as applied to claim 1, and further in view of Watanabe (US PAT. 5,450,057 hereinafter Watanabe).

Regarding claim 39, Warnaka as modified by Clark differs from claim 39 in not disclosing that the system of the processed audio signals represent global or local vehicle warnings delivered to the entire or local interior sections of the vehicle.

However, Watanabe teaches that a system of the processed audio signals represent global or local vehicle warnings delivered to the entire or local interior sections of the vehicle (see col.1 lines 35-65).

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Warnaka as modified by Clark with the teaching of Watanabe to provide a safety loudspeaker system.

8. Claims 12,24 and 43,44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Warnaka (US PAT 6,356,641) in view of Clark (US PAT 5,754,664) as applied to claim 1 above, and further in view of Yamashita (US PAT 6,337,355).

Regarding claims 12, 24, while Warnaka as modified teach the headliner material is a thermosetting foam (see col.5 line 55- col.6 line 25), Warnaka as modified by Clark fails to teach the headliner material has a stiffness (modulus of elasticity, Youngs modulus) between 1E9PA and 5E9PA and a density between 100 and 800 Kg/m^3 and wherein the headliner material may be made from single materials or composites.

However, Yamashita teaches a headliner material (urethane foam) has a stiffness inherently between 1GPa and 5GPa and a density between 100 and 800 Kg/m^3 and wherein the headliner material may be made from single materials or composites (see col.17 line 4-col.18 line 67).

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to use the urethane foam as taught by Yamashita as the headliner material in the system of Warnaka as modified by Clark so as to provide accurate filling

and reduced non-filled sites in a mass production environment (col. 31, line 11 – col. 32, line 33).

Regarding claims 43-44, Warnaka teaches an audio system for use in a vehicle having a roof, the system comprising:

an acoustically-insulating headliner adapted to be mounted adjacent the roof so as to underlie the roof and shield the roof from view (see fig.1 and 9), the headliner having an upper surface (see fig.9) and a sound-radiating, lower surface (see col.8 line 32-col.9 line 10);

an array of electromagnetic transducer (see fig.1, (15)) assemblies supported at the upper surface of the headliner (see fig.1);

a source of audio signal (see fig.16, (161) and col.10 line 11-50); and

the headliner is made of a material which is sufficiently stiff (metal, polymer) and low in density (foam and fabri and see col.col.3 line 55 –col.4 line 15) so that substantially the entire headliner acts as a single headliner speaker diaphragm (literally function as a diaphragm in a speaker and see col. 3 line 20-43) , but Warnaka does not teach clearly the signal processing circuitry coupled to the assemblies for processing the audio signals to obtain processed audio signals wherein the assemblies convert the processed audio signals into mechanical motion of corresponding zones of the headliner and radiates acoustic power into the interior of the vehicle with a frequency range defined by a lower limit of 100 hertz or less and an upper limit of 12 kilohertz or more and the processed audio signals at a low end of the frequency range are matched to the processed audio signals at mid and high ends of the frequency range and

wherein the headliner material has a stiffness (modulus of elasticity, Young's modulus) between 1E9 Pa and 5e9 Pa and a density between 100 and 800 Kg/m'3 and wherein the headliner material may be made from single materials or composites.

However, Clark teaches the signal processing circuitry (see fig.9) coupled to the assemblies for processing the audio signals to obtain processed audio signals wherein the assemblies convert the processed audio signals into mechanical motion of corresponding zones (see col.5 line 15-col.6 line 50) of the headliner and radiates acoustic power into the interior of the vehicle with a frequency range defined by a lower limit of 100 hertz or less and an upper limit of 12 kilohertz or more and the processed audio signals at a low end of the frequency range are matched to the processed audio signals at mid and high ends of the frequency range (see col.4 line 5-67).

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Warnaka and Clark to improve audio output controlling system to provide listening pleasure for passengers in the vehicle.

Warnaka as modified by Clark fails to teach the headliner material has a stiffness (modulus of elasticity, Young's modulus) between 1E9PA and 5E9PA and a density between 100 and 800 Kg/m^3 and wherein the headliner material may be made from single materials or composites.

On the other hand, Yamashita teaches a headliner material (urethane foam) has a stiffness inherently between 1GPa and 5GPa and a density between 100 and 800

Kg/m^3 and wherein the headliner material may be made from single materials or composites (see col.17 line 4-col.18 line 67).

Therefore, it would have obvious to one of ordinary skill in the art at the time the invention was made to use the urethane foam as taught by Yamashita as the headliner material in the system of Warnaka as modified by Clark so as to provide accurate filling and reduced non-filled sites in a mass production environment (col. 31, line 11 – col. 32, line 33).

Response to Arguments

9. Applicant's arguments filed 02/25/2003 has been fully considered butt they are not persuasive.

Applicant argued that the prior art does not teach "substantially the entire headliner acts as single headliner speaker diaphragm and radiates acoustic power into the interior of the vehicle with a frequency range defined by a lower limit of 100 hertz or less and an upper limit of 12 kilohertz or more".

The examiner respectfully disagrees. Clark discloses substantially the entire headliner acts as single headliner speaker diaphragm (see fig.2 and 5)(col.3 line 50-col.5 line65) and radiates acoustic power into the interior of the vehicle with a frequency range defined by a lower limit of 100 hertz or less and an upper limit of 12 kilohertz or more (see col.4 lines 5-67).

Conclusion

10. Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:(703) 872-9314

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lao,Lun-See whose telephone number is (703) 305-2259 The examiner can normally be reached on Monday-Friday from 8:00 to 6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis Kuntz, can be reached on (703) 305-4708.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 whose telephone number is (703) 306-0377.

Lao,Lun-See
Patent Examiner
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DUC NGUYEN
PRIMARY EXAMINER